RESEARCH AND DEVELOPMENT IN THE 1998 BUDGET: AN OVERVIEW

INTRODUCTION

This report presents information on Federal proposed fiscal year (FY) 1998 budget authority for the research and development (R&D) components of agency programs. The data were submitted by Federal agencies to the Office of Management and Budget in early 1997. This report documents historical data not affected by current legislation and therefore can be used for tracking funding trends. The report also provides detailed data on Federal R&D authorizations that are not readily available from other sources.

TOTAL R&D

In the first half of 1997, the administration proposed total budget authority of $72 billion for FY 1998 for all Federal R&D programs, an increase of 1 percent from the estimated 1997 R&D total of $71 billion (table 1). After adjusting for expected inflation, proposed R&D budget authority will decrease 2 percent. Budget authority for R&D grew 3 percent between 1996 and 1997 (an increase of 0.2 percent in constant dollars).

Table 1. Federal R&D budget authority, by budget function, Fiscal years 1996-98

1998 rank	Budget function	1996 actual	1997 preliminary 1/	1998 proposed	Percentage change 1996-97	Percentage change 1997-98
		[In millions of dollars]				
	Total	69,049	70,988	71,602	2.8	0.9
1	National defense	37,801	39,030	38,726	3.2	-0.8
2	Health	11,867	12,693	12,998	7.0	2.4
3	Space research and technology	7,844	7,795	8,004	-0.6	2.7
4	General science	2,846	2,962	3,086	4.1	4.2
5	Energy	2,521	2,259	2,229	-10.4	-1.3
6	Transportation	1,795	1,827	1,939	1.8	6.2
7	Natural resources and environment	1,802	1,842	1,902	2.2	3.2
8	Agriculture	1,176	1,185	1,196	0.8	0.9
9	Commerce and housing credit	432	435	498	0.8	14.4
10	Education, training, employment, and social services	331	370	411	11.8	11.1
11	International affairs	252	190	246	-24.6	29.5
12	Veterans benefits and services	259	267	239	3.1	-10.5
13	Administration of justice	56	67	70	19.6	4.5
14	Community & regional development	50	54	46	8.0	-14.8
15	Income security	16	10	10	-37.5	0.0
16	General government	2	2	2	0.0	0.0

1/ Adjusted to reflect rescissions and supplementals enacted in Public Law 105-18.

KEY: NA = Not applicable

NOTES: Because of rounding, components may not add to the totals shown. Percentage change is derived from unrounded data.

SOURCE: Agencies' submissions to Office of Management and Budget MAX Schedule C; agency budget justification documents; and supplemental data obtained from the agencies' budget offices.

Among individual functions, the largest 1998 R&D decrease ($0.3 billion) is slated for defense (budget function code 050), which includes military programs of the Department of Defense and the atomic energy defense activities of the Department of Energy (DOE).

Proposed defense-related R&D funding is $38.7 billion in 1998, a 1-percent decrease from the preliminary 1997 level. This proposed decrease reverses the rise of 3 percent in budget authority for defense-related R&D between 1996 and 1997. However, R&D funding within the national defense function has continued to decrease in real terms since 1993 (with the exception of a 0.7-percent increase between FYs 1996-97). The proposed real decrease in defense-related R&D budget authority is offset by an increase in proposed funding of civilian R&D in 1998. Nondefense R&D funding is anticipated to grow by about 3 percent to $32.9 billion in 1998 (0.1 percent in constant dollars). Civilian-related activities represent 46 percent of Federal funding for the conduct of R&D. The proportion of R&D funds proposed for defense-related activities has declined from 55.0 percent in 1997 to 54.1 percent in 1998.

The five largest budget functions with respect to R&D expenditures—national defense, health, space research and technology, general science, and energy—together account for 91 percent of all proposed Federal R&D funding. Health, space, and general science functions are proposed to receive increased funding for R&D in 1998. Highlights of proposed R&D funding by function in the 1998 budget follow.

- National defense R&D funding (function 050) is proposed to drop by $0.3 billion or 1 percent below 1997 levels. Army would experience major decreases in funding, losing 8 percent (a drop of $0.4 billion) of its research, development, test, and evaluation (RDT&E) funds. Navy RDT&E would decline 3 percent, from $7.8 billion in FY 1997 to $7.6 billion in FY 1998. Among the defense agencies, the Ballistic Missile Defense Organization (BMDO) funding is proposed to decline 23.5 percent between FYs 1997-98. However, the Defense Advanced Research Projects Agency (DARPA) expects a 3-percent increase. Only one of DOE's defense-related R&D programs will gain funding over 1997 levels—nuclear safeguards and security, up 10 percent. Although proposed funding for DOE's stockpile management is $21 million in FY 1998, this amount reflects transferring of some nuclear materials R&D costs from DOE's stockpile stewardship program. All of DOE's other defense-related R&D programs are expected to get less or nearly the same funding as in FY 1997.

- The administration proposes a 2-percent increase ($0.3 billion) in health-related R&D (function 550) to $13 billion in 1998. Most of this proposed growth is for the basic and applied biomedical and behavioral research programs of the National Institutes of Health (NIH), which will account for 95 percent of all Federal health R&D. R&D programs for all except one component of NIH will receive greater support in FY 1998 than in FY 1997.

  Funding for NIH's Office of the Director is expected to fall 7 percent. Within the Office of the Director, the Women's Health Initiative and other research activities are slated for funding below their 1997 levels, decreasing 4 percent and 12.5 percent, respectively. More than $2 billion is proposed for R&D projects at the National Cancer Institute. Also, $1.5 billion is proposed for R&D on AIDS/HIV within the Office of AIDS Research, and $1.4 billion is slated for R&D programs at the National Heart, Lung, and Blood Institute. The National Institute on Drug Abuse expects to receive a 9-percent increase (up $30 million) over FY 1997. The National Human Genome Research Institute (it became an institute on January 14, 1997) expects an 8.5-percent increase (up $15 million) over FY 1997.

- R&D budget authority for space research and technology activities (subfunction 252) of the National Aeronautics and Space Administration (NASA) is proposed to increase nearly 3 percent over the FY 1997 funding level. It will increase by $0.2 billion to $8 billion. NASA expects to fund its largest program, space station research, at 8 percent over the FY 1997 level. The 32-percent decrease in NASA's life and microgravity sciences account is due to the transfer of space station related research programs to the space station account. The space science program, NASA's second largest R&D account, is proposed to receive $2.3 billion, up 3 percent from l997. Major

increases are scheduled for R&D activities for the Mission to Planet Earth (MTPE) program, which will receive an increase of $62 million (up 4 percent), to $1.6 billion in 1998. The budget also proposes that NASA receive increases for space transportation technology and for other human space flight programs, increasing $51 million and $25 million, respectively, from FY 1997 levels.

- Research funding for general science (subfunction 251) is proposed to increase by 4 percent, or $0.1 billion in 1998, to $3 billion. Most of these dollars are slated for the National Science Foundation (NSF); the remaining funds are for DOE general science programs. All programs are proposed to gain funding, ranging between 1 percent to 10 percent over FY 1997 levels. NSF expects to increase research funding to computer and information science and engineering by $25 million or 10 percent above FY 1997. Also, NSF proposes to direct $19 million more toward mathematical and physical sciences research (up 3 percent). DOE's research budget is proposed to grow 5 percent with increases in high energy physics programs (up 6 percent over the FY 1997 level) and nuclear physics activities (up 3 percent).

- A 1-percent decrease (down $30 million) is proposed for energy R&D (function 270) to $2.2 billion in 1998. Energy R&D will comprise 3 percent of total Federal R&D budget authority. The decrease in energy funding is due largely to less support for the fossil energy programs, specifically for clean coal technology. DOE expects to cancel $286 million in unspent, previously appropriated funds for its clean coal technology program under the its fossil energy account. However, the increase in funding for DOE's energy supply programs is attributable to greater support for the solar and renewable energy account, an increase of $76 million, and energy conservation programs, an increase of $63 million. The Tennessee Valley Authority is expected to get $30 million more than its FY 1997 funding level, a 73-percent increase. The Nuclear Regulatory Commission expects to receive $3 million less than it did in FY 1997, down 5 percent.

- Transportation R&D funding (function 400) is proposed to increase by more than 3 percent to $1.7 billion. Three-fourths of the increase (up $67 million from 1997) is slated for air transportation research mostly by NASA for aeronautical research and technology. Funding for ground transportation, however, also is proposed to increase significantly (up $45 million) and will account for 21 percent of the total transportation R&D.

- Natural resources and the environment R&D funding (function 300) is proposed to increase by 3 percent to $2 billion in FY 1998. Within this functional category, the largest gain (an increase of $44 million, up 9 percent) is proposed for the Environmental Protection Agency's (EPA's) science and technology efforts. (This account was created in FY 1996 to consolidate most of EPA's R&D activity.) This EPA account comprises nearly all of the agency's funding for pollution control and abatement, as well as R&D transferred from EPA's Superfund account.

  Moderate decreases (from $533 million in FY 1997 to $525 million in FY 1998) are planned for the National Oceanic and Atmospheric Administration's (NOAA's) natural resources initiatives, which include NOAA's oceanic and atmospheric research programs and initiatives.

- Funding for agricultural R&D (subfunction 352) is proposed to increase in 1998 by 1 percent to $1.2 billion, and would account for under 2 percent of the total Federal R&D budget authority. Over half of the Department of Agriculture's (USDA's) R&D funding is for the Agricultural Research Service (ARS), an intramural research agency whose primary responsibility includes providing initiative and leadership in agricultural research. Several initiatives, including the research on plant sciences, commodity conversion and delivery, and animal sciences, are funded by ARS. The ARS has 103 research laboratories throughout the United States and abroad. Another USDA program, the National Research Initiative (NRI), is expected to increase 38 percent to $130 million in FY 1998. NRI programs support research on integrated pest management, biological control of pests and diseases, human nutrition, plant genome, water quality, food safety, sustainable agriculture, and agricultural systems.

- The remaining eight functions each have less than $0.5 billion in proposed 1998 R&D budget authority. However, overall R&D for these functions will increase by more than 8 percent ($118 million) to $1.5 billion. The main areas of this growth are in commerce and housing credit (up $63 million); international affairs (up $56 million); and education, training, employment, and social services (up $41 million).

  - R&D for commerce and housing credit (function 370) will increase by 14 percent ($63 million) to nearly $0.5 billion. This total reflects increased support for the Advanced Technology Program (ATP) funded at the National Institute of Standards and Technology (NIST). The ATP funds precompetitive R&D on commercial technologies on a cost-shared basis through a competitive process. Funding for research and general education programs (subfunctions 501-3) of the Department of Education and the Smithsonian Institution will increase by 12 percent ($29 million) to $278 million.

  - The administration proposes to increase funds for international affairs (function 150) by 29.5 percent, up $56 million from the FY 1997 level. This increase is due mainly to additional funding of the global programs in the Agency for International Development.

  - Funding for administration of justice (function 750) of the Departments of Justice and Treasury will increase by 4.5 percent to $70 million in FY 1998.

  - A 10.5–percent decrease (to $239 million) is slated for veterans benefits and services (function 700), due to decreased funding of the medical and prosthetic research programs in the Department of Veterans Affairs. R&D funding is also expected to drop 15 percent (to $46 million) in community and regional development (function 450). R&D funding will stay at FY 1997 levels for income security (function 600) and for general government (function 800), $10 million and $2 million, respectively.

Distribution of Total R&D Budget Authority Among Functions

The five largest R&D functions in 1998—defense, health, space research, general science, and energy—account for 91 percent of all proposed Federal R&D budget authority. Transportation, natural resources and the environment, agriculture, and commerce and housing credit each account for between 1 and 3 percent of Federal funding of R&D. The remaining seven functions each account for less than 1 percent of the total 1998 proposed R&D budget authority (table 2).

During the early and mid-1980s, practically all growth in Federal R&D support was defense-related (chart 1). Since 1986, however, defense R&D has dropped significantly from its peak 69-percent share of the Federal total to the proposed 54-percent share for 1998 (table 3). Despite this decline, defense is proposed to receive more than three times the budget authority for R&D than the next largest function, health.

Proportions of seven functions to the total R&D budget authority would be larger in 1998 than in 1997—health; space research; general science; transportation; natural resources and environment; commerce and housing credit; and education, training, employment, and social services. Proportions for agriculture; international affairs; community and regional development; administration of justice; income security; and general government will stay the same as in 1997. Based on the administration's budget proposal, proportions of three functions would drop in FY 1998—defense, energy, and veterans benefits and services.

Basic Research

The administration proposes to increase budget authority for basic research by 3 percent in 1998 to $15 billion (table 4). When adjusted for expected inflation, this would be about a 0.2-percent increase from the estimated 1997 level. The total dollar amount for basic research, as well as the basic research share of total R&D budget authority, has slowly increased from 15 percent in 1986 to the proposed 21 percent in 1998 (chart 2).

Table 2. Distribution of total R&D budget authority, by function: Fiscal years 1996-98

[In percentages]

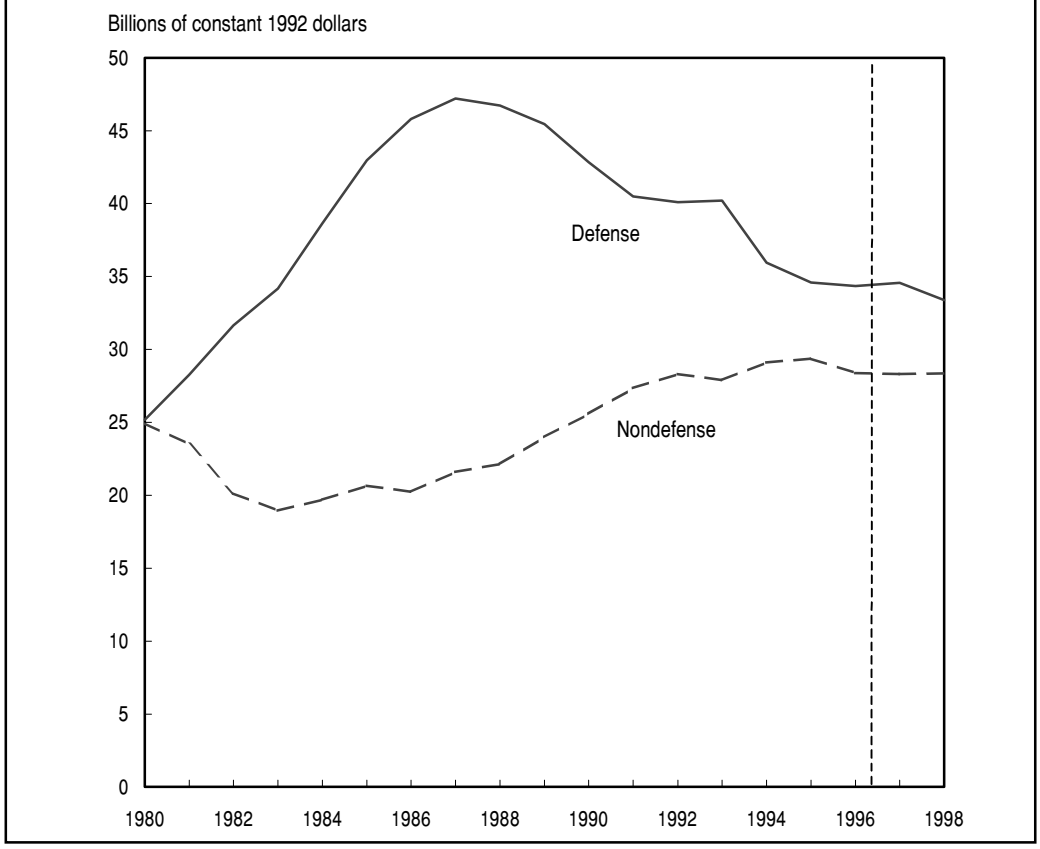
1998 rank	Budget function	1996 actual	1997 preliminary 1/	1998 proposed
	Total	100.0	100.0	100.0
1	National defense	54.7	55.0	54.1
2	Health	17.2	17.9	18.2
3	Space research and technology	11.4	11.0	11.2
4	General science	4.1	4.2	4.3
5	Energy	3.7	3.2	3.1
6	Transportation	2.6	2.6	2.7
7	Natural resources and environment	2.6	2.6	2.7
8	Agriculture	1.7	1.7	1.7
9	Commerce and housing credit	0.6	0.6	0.7
10	Education, training, employment, and social services	0.5	0.5	0.6
11	International affairs	0.4	0.3	0.3
12	Veterans benefits and services	0.4	0.4	0.3
13	Administration of justice	0.1	0.1	0.1
14	Community & regional development	0.1	0.1	0.1
15	Income security	(2/)	(2/)	(2/)
16	General government	(2/)	(2/)	(2/)

1/ Adjusted to reflect rescissions and supplementals enacted in Public Law 105-18.
2/ Less than one-tenth of one percent.

NOTE: Because of rounding, components may not add to totals.

SOURCE: Agencies' submissions to Office of Management and Budget MAX Schedule C; agency budget justification documents; and supplemental data obtained from the agencies' budget offices.

Chart 1. Federal budget authority for defense and nondefense R&D: Fiscal years 1980-98[1]



[1]1997 numbers are preliminary; 1998 numbers are proposed.

SOURCE: Agencies' submissions to Office of Management and Budget Circular No. A-11, Max Schedule C, "Research and Development Activities;" agency budget justification document; and supplemental data obtained from the agencies' budget offices.

Table 3. Federally funded R&D for national defense and civilian functions: Fiscal years 1955-98

Fiscal year	Current dollars			Constant 1992 dollars1/			Percent of total	
	Total	National defense	Civilian functions	Total	National defense	Civilian functions	National defense	Civilian functions
	[In millions of dollars]							
1955	2,533	2,151	382	12,551	10,658	1,893	84.9	15.1
1956	2,988	2,535	453	14,299	12,131	2,168	84.8	15.2
1957	3,932	3,327	605	18,120	15,332	2,788	84.6	15.4
1958	4,570	3,801	769	20,552	17,094	3,458	83.2	16.8
1959	6,694	5,556	1,138	29,396	24,399	4,997	83.0	17.0
1960	7,552	6,107	1,445	32,401	26,202	6,200	80.9	19.1
1961	9,059	7,005	2,054	38,268	29,592	8,677	77.3	22.7
1962	10,290	7,238	3,052	43,038	30,273	12,765	70.3	29.7
1963	12,495	7,764	4,731	51,581	32,051	19,530	62.1	37.9
1964	14,225	7,829	6,396	58,017	31,931	26,086	55.0	45.0
1965	14,614	7,342	7,272	58,601	29,441	29,160	50.2	49.8
1966	15,320	7,536	7,784	60,115	29,571	30,544	49.2	50.8
1967	16,529	8,566	7,963	62,773	32,531	30,241	51.8	48.2
1968	15,921	8,275	7,646	58,342	30,323	28,018	52.0	48.0
1969	15,641	8,356	7,285	54,865	29,311	25,554	53.4	46.6
1970	15,339	7,981	7,358	51,113	26,595	24,519	52.0	48.0
1971	15,543	8,110	7,433	49,261	25,703	23,557	52.2	47.8
1972	16,496	8,902	7,594	49,894	26,925	22,969	54.0	46.0
1973	16,800	9,002	7,798	48,696	26,093	22,603	53.6	46.4
1974	17,410	9,016	8,394	47,103	24,393	22,710	51.8	48.2
1975	19,039	9,679	9,360	46,689	23,736	22,954	50.8	49.2
1976	20,780	10,430	10,350	47,522	23,853	23,670	50.2	49.8
1977	23,450	11,864	11,586	49,867	25,229	24,638	50.6	49.4
1978	25,976	12,899	13,077	51,655	25,651	26,005	49.7	50.3
1979	28,208	13,791	14,417	51,778	25,314	26,464	48.9	51.1
1980	29,739	14,946	14,793	50,111	25,185	24,927	50.3	49.7
1981	33,735	18,413	15,322	51,776	28,260	23,516	54.6	45.4
1982	36,115	22,070	14,045	51,773	31,639	20,134	61.1	38.9
1983	38,768	24,936	13,832	53,125	34,170	18,954	64.3	35.7
1984	44,214	29,287	14,927	58,345	38,647	19,698	66.2	33.8

See explanatory notes and SOURCE at end of table.

Table 3. Federally funded R&D for national defense and civilian functions: Fiscal years: 1955-98

Fiscal year	Current dollars			Constant 1992 dollars 1/			Percent of total	
	Total	National defense	Civilian functions	Total	National defense	Civilian functions	National defense	Civilian functions
	[In millions of dollars]							
1985	49,887	33,698	16,189	63,627	42,979	20,648	67.5	32.5
1986	53,249	36,926	16,323	66,057	45,808	20,249	69.3	30.7
1987	57,069	39,152	17,917	68,810	47,207	21,603	68.6	31.4
1988	59,106	40,099	19,007	68,878	46,728	22,149	67.8	32.2
1989	62,115	40,665	21,450	69,452	45,468	23,984	65.5	34.5
1990	63,781	39,925	23,856	68,448	42,847	25,602	62.6	37.4
1991	65,898	39,328	26,570	67,827	40,479	27,348	59.7	40.3
1992	68,398	40,083	28,315	68,398	40,083	28,315	58.6	41.4
1993	69,884	41,249	28,635	68,085	40,187	27,898	59.0	41.0
1994	68,331	37,764	30,566	65,054	35,953	29,101	55.3	44.7
1995	68,791	37,204	31,587	63,931	34,575	29,356	54.1	45.9
1996	69,049	37,801	31,248	62,728	34,341	28,387	54.7	45.3
1997 2/ 3/	70,988	39,030	31,959	62,879	34,571	28,308	55.0	45.0
1998 4/	71,602	38,726	32,876	61,733	33,388	28,345	54.1	45.9

1/ Calculated using fiscal year GDP implicit price deflators with 1992 as the base year.

2/ Adjusted to reflect rescissions and supplementals enacted in Public Law 105-18.

3/ Preliminary

4/ Proposed

NOTES: The national defense function includes Department of Defense's military activities and Department of Energy's atomic energy defense programs. Civilian functions include all other Federally funded R&D activities. Data for 1955-77 are obligations. Data for 1978-96 are actual budget authority. Data for FY 1997 are preliminary estimates of budget authority. Data for FY 1998 are budget authority proposed by the administration.

SOURCE: Agencies' submissions to Office of Management and Budget MAX Schedule C; agency budget justification documents; and supplemental data obtained from the agencies' budget offices.

Table 4. Budget authority for basic research, by budget function, Fiscal years 1996-98

1998 rank	Budget function	1996 actual	1997 preliminary 1/	1998 proposed	Percent change	
					1996-97	1997-98
		[In millions of dollars]				
	Total	14,442	14,853	15,296	2.8	3.0
5	National defense	1,165	1,133	1,191	-2.7	5.1
1	Health	6,395	6,826	7,015	6.7	2.8
3	Space research and technology	1,685	1,557	1,517	-7.6	-2.6
2	General science	2,662	2,773	2,886	4.2	4.1
4	Energy	1,182	1,219	1,313	3.1	7.8
7	Transportation	456	445	429	-2.4	-3.6
8	Natural resources and environment	147	149	157	0.9	5.9
6	Agriculture	547	545	563	-0.3	3.4
10	Commerce and housing credit	37	39	40	5.4	2.6
9	Education, training, employment, and social services	140	139	146	-0.7	5.0
13	International affairs	2	2	1	0.0	-50.0
12	Veterans benefits and services	13	14	14	7.7	0.0
11	Administration of justice	12	12	24	0.0	100.0
14	Community & regional development	0	0	0	NA	NA
15	Income security	0	0	0	NA	NA
16	General government	0	0	0	NA	NA

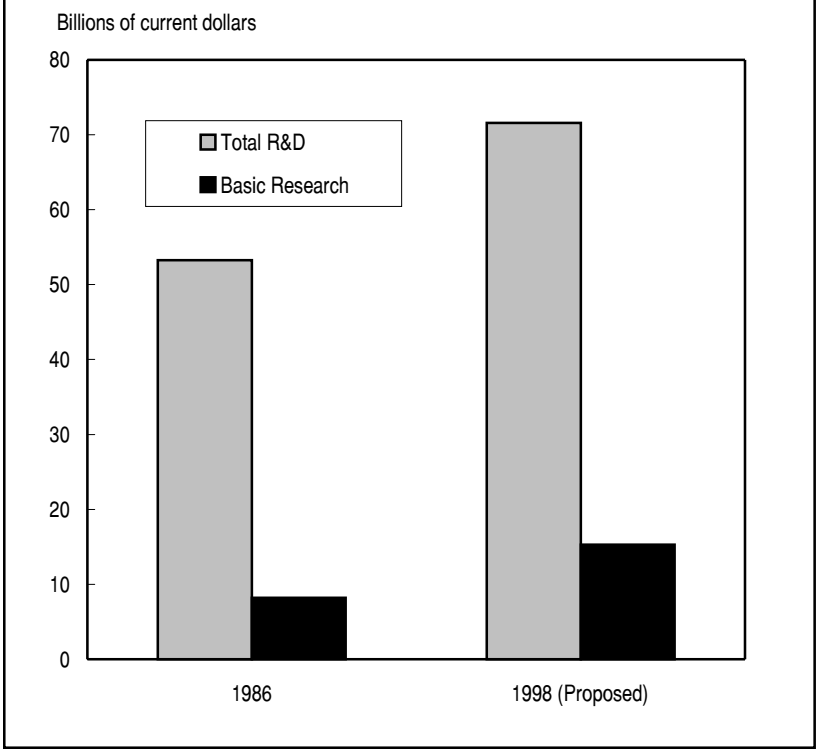
1/ Adjusted to reflect rescissions enacted in Public Law 105-18.

NOTES: Because of rounding, components may not add to the totals shown. Percentage change is derived from unrounded data.

KEY: NA = Not applicable

SOURCE: Agencies' submissions to Office of Management and Budget MAX Schedule C; agency budget justification documents; and supplemental data obtained from the agencies' budget offices.

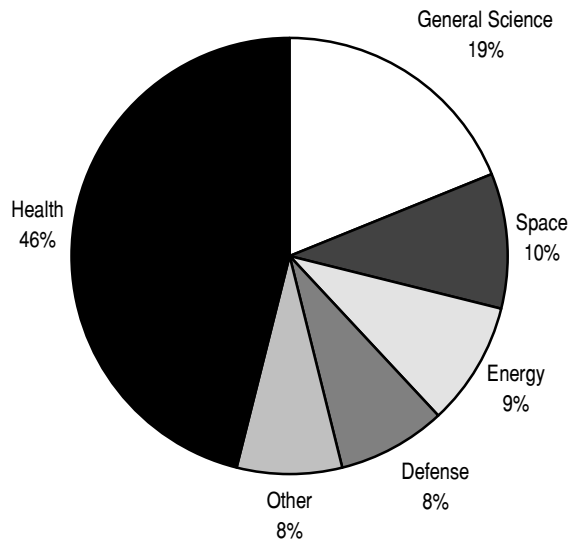
Chart 2. Federal budget authority for basic research compared with total R&D budget authority: Fiscal years 1986 and 1998



SOURCE: Agencies' submissions to Office of Management and Budget Circular No. A-11, Max Schedule C, "Research and Development Activities;" agency budget justification document; and supplemental data obtained from the agencies' budget offices.

The largest five R&D functions—defense, health, space research and technology, general science, and energy—are also the largest basic research functions; they account for 91 percent of the basic research total (chart 3). Health ($7 billion) accounts for the largest share (46 percent) of the requested 1998 basic research total, followed by general science ($3 billion) and space research and technology ($1.5 billion). Defense accounts for $1.2 billion—or nearly 8 percent—of the proposed basic research total, but only 3 percent of the defense R&D total is basic research. (The basic research portion of the defense R&D total has remained at about 3 percent for the last seven years.) Of the nondefense R&D total, 43 percent is basic research.

Chart 3. Proposed Federal budget authority for basic research by budget function: Fiscal year 1998
(In percents)



SOURCE: Agencies' submissions to Office of Management and Budget Circular No. A-11, Max Schedule C, "Research and Development Activities;" agency budget justification document; and supplemental data obtained from the agencies' budget offices.

R&D's Share of Total Budget Authority

The proportion of R&D funding out of the total funding for functions in which R&D is conducted continues to remain at about 8 percent (table 5). Since FY 1990, the percent has fluctuated from a high of 8.2 percent in FY 1996 to a low of 7.6 percent in FY 1991. For functions that include R&D activities, only three (energy, general science, and space research) are expected to be more than 60 percent of each function's total budget authority. (Energy R&D is greater than total energy budget authority because gross budget authority has been reduced by offsetting receipts, for total net budget authority that is less than R&D budget authority.) The R&D shares in the other functions range from a high of 15 percent for national defense to less than 0.1 percent for income security and general government.

Only four functions (space research, general science, transportation, and commerce and housing credit) will show an increased share of their budget authority directed toward R&D in FY 1998. The R&D share of eight functions is expected to drop.

Table 5. R&D budget authority as a percent of each function's total budget authority, Fiscal years 1996-98

1998 rank	Budget function	1996 actual	1997 preliminary 1/	1998 proposed
	All functions conducting R&D	8.2	8.0	7.8
4	National defense	14.2	14.9	14.6
6	Health	10.8	9.8	9.7
3	Space research and technology	62.4	62.7	66.0
2	General science	68.7	69.8	71.0
1	Energy 2/	95.2	235.1	117.9
9	Transportation	4.9	4.2	4.4
7	Natural resources and environment	8.3	8.3	8.0
5	Agriculture	12.2	10.4	9.9
8	Commerce and housing credit	5.2	3.4	6.0
11	Education, training, employment, and social services	0.6	0.7	0.6
10	International affairs	1.5	1.1	1.1
12	Veterans benefits and services	0.7	0.7	0.6
14	Administration of justice	0.3	0.3	0.3
13	Community & regional development	0.4	0.5	0.4
16	Income security	(3/)	(3/)	(3/)
15	General government	(3/)	(3/)	(3/)

1/ Adjusted to reflect rescissions and supplementals enacted in Public Law 105-18.
2/ R&D as percentage of total budget authority is greater than 100 percent because gross budget authority has been reduced by offsetting receipts, for total (net) budget authority that is less than R&D budget authority.
3/ Less than one-tenth of 1 percent

NOTE: Total budget authority includes discretionary and mandatory budget authority, less offsets.

SOURCE: Agencies' submissions to Office of Management and Budget MAX Schedule C; agency budget justification documents; supplemental data obtained from the agencies' budget offices; Office of Management and Budget, *Budget of the United States Government, Fiscal Year 1998,* Washington, DC: February, 1997 (Table 31-1).